REMARKS

Claims 1 – 5 and 13 – 14 are pending and under consideration in the above-identified application.

In the Office Action, Claims 1 – 5 and 13 – 14 were rejected.

In this Amendment, Claims 1, 2, 13 and 14 are amended. No new matter has been introduced as a result of this amendment.

Accordingly, claims 1 – 5 and 13 – 14 remain at issue.

I. Objection To The Specification

The Examiner objected to the title and specification of the disclosure. In response, Applicants have appropriately amended the title and the Brief Description of the Drawings.

Accordingly, Applicants respectfully request withdrawal of these objections.

II. 35 U.S.C. § 103 Rejection of Claims

Claims 1-5, 13-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lin et al. ("Lin") (U.S. Patent No. 6,262,869) in view of Fontana Jr. et al. (U.S. Patent No. 5,992,410). Although Applicants respectfully traverse these rejections, Claims 1, 2, 13 and 14 have been amended to clarify the invention and remove any ambiguities that may have been at the basis of these claim rejections.

Claim 1 is directed to a magnetic head using magnetoresistive effect comprising a magnetic sensing portion formed of a magnetoresistive effect element. The magnetic sensing portion includes a lamination layer structure portion in which at least a free layer made of a soft magnetic material of which the magnetization is rotated in response to an external magnetic field, a fixed layer made of a ferromagnetic material, an antiferromagnetic layer for fixing the magnetization of the fixed layer and a spacer layer interposed between the free layer and the fixed layer are laminated with each other in a thickness direction. The lamination layer structure portion further includes a magnetic flux introducing layer of which the tip end is opposed to a surface which is brought in contact with or opposed to a magnetic recording medium, *and said magnetic flux introducing layer formed directly on said free layer.* The lamination layer

structure portion has at the thickness direction opposing side surfaces formed of one flat surface or continuous one curved surface over at least the free layer, *the magnetic flux introducing,* the spacer layer and the fixed layer. A hard magnetic layer having high resistance or low resistance for maintaining a magnetic stability of the free layer is disposed in direct contact with the opposing surfaces or through an insulating layer. A sense current for the lamination layer structure portion flows through the lamination layer structure portion in the thickness direction. An external magnetic field is applied to the direction extended along the plane direction of the lamination layer structure portion and which is extended substantially along the opposing side surfaces.

In contrast, both Lin and Fontana fail to teach or disclose a lamination having a free layer, a fixed layer, an antiferromagnetic layer, a space layer, and a magnetic flux introducing layer which is formed directly on the free layer.

Lin teaches and illustrates in at least FIG. 16 that a seed layer 310 and a top oxide layer 324 are interposed between the sense (free) layer 304 and the keeper (magnetic introducing) layer 320. In addition, Fontana discloses in at least FIG. 5 that a lamination layer structure includes an antiferromagnetic layer 116, a fixed layer 118, a tunnel barrier layer 120 and a sensing ferromagnetic layer 132. Therefore, both Lin and Fontana fail to teach or suggest a lamination having a magnetic flux introducing layer which is formed directly on the free layer. Thus, Lin and Fontana may not be properly combined to reject Claim 1.

Accordingly, Claim 1 is patentable over Lin in view of Fontana.

Amended Claim 13 recites the same distinguishable feature as that of Claim 1. Thus, Claim 13 is also patentable over Lin in view of Fontana.

Amended Claim 2 recites that a magnetic head using magnetoresistive effect comprises a magnetic sensing portion formed of a magnetoresistive effect element. The magnetic sensing portion includes a lamination layer structure portion in which at least first and second fixed layers made of ferromagnetic materials, first and second antiferromagnetic layers for fixing the magnetizations of the fixed layers and first and second spacer layers interposed between free

layers and the first and second fixed layers are laminated together in a thickness direction of the magnetic sensing portion across both surfaces of the free layers made of soft magnetic materials of which the magnetizations are rotatable in response to an external magnetic field, the lamination layer structure portion further includes a magnetic flux introducing layer of which a side end surface is opposed to a surface of the magnetic head which is brought in contact with or opposed to a magnetic recording medium, *and the magnetic flux introducing layer formed along the thickness direction on opposing side surfaces of at least the free layer, the spacer layer and the fixed layer,* the lamination layer structure portion has along the thickness direction opposing side surfaces of at least the free layer, the spacer layer and the fixed layer formed of one flat surface or one continuous curved surface; a hard magnetic layer for maintaining a magnetic stability of the layer is disposed in direct contact with the opposing surfaces or through an insulating layer, a sense current for the lamination layer structure portion flows through the lamination layer structure portion in the thickness direction, and an external magnetic field is applied to the direction extended along the plane direction of the lamination layer structure portion and which is extended substantially along the opposing side surfaces.

Thus, the claimed magnetic flux introducing layer is formed along the thickness direction on opposing side surfaces of at least the free layer, the spacer layer and the fixed layer.

In contrast, as stated above Lin teaches in FIG. 16 that the keeper layer 320 is laminated with the seed layer 310, the top oxide layer 324, and the sense (free) layer 304. In addition, Fontana discloses that hard magnetic layers 150 are disposed in contact with opposing surfaces of the antiferromagnetic layer 116, the fixed layer 118, the tunnel barrier layer 120 and the sensing ferromagnetic layer 132 through insulating layers 160. Therefore, both Lin and Fontana fail to teach or suggest a magnetic flux introducing layer formed along the thickness direction on opposing side surfaces of at least the free layer, the spacer layer and the fixed layer. Thus, Lin and Fontana may not be properly combined to reject Claim 2. Accordingly, Claim 1 is patentable over Lin in view of Fontana.

For reasons similar to those discussed with regard to Claim 1 or 2, Applicants respectfully submit that Claims 3 – 5 are also patentable over Lin in view of Fontana.

Amended Claim 14 recites that a magnetic head using magnetoresistive effect comprises a magnetic sensing portion formed of a magnetoresistive effect element. The magnetic sensing portion includes a lamination layer structure portion in which at least first and second fixed layers made of ferromagnetic materials, first and second antiferromagnetic layers for fixing the magnetizations of the fixed layers and first and second spacer layers interposed between magnetic flux introducing layers and the first and second fixed layers are laminated with together in a thickness direction of the magnetic sensing portion across both surfaces of the magnetic flux introducing layers made of soft magnetic materials of which the magnetizations are rotatable in response to an external magnetic field, *and one of the magnetic flux introducing layers formed directly on one of the first and second spacer layers,* wherein a side end surface of the magnetic flux introducing layer is opposed to a surface which is brought in contact with or opposed to a magnetic recording medium. The lamination layer structure portion has at the thickness direction opposing side surfaces of at least the magnetic flux introducing layer, the spacer layer and the fixed layer formed of one flat surface or one continuous curved surface, a hard magnetic layer for maintaining a magnetic stability of the layer is disposed in direct contact with the opposing surfaces or through an insulating layer, a sense current for the lamination layer structure portion flows through the lamination layer structure portion in the thickness direction, and an external magnetic field is applied to the direction extended along the plane direction of the lamination layer structure portion and which is extended substantially along the opposing side surfaces.

As amended Claim 14 recite that one of the magnetic flux introducing layers formed directly on one of the first and second spacer layers.

In contrast, as stated above Lin teaches and illustrates in at least FIG. 16 that a seed layer 310 and a top oxide layer 324 are interposed between the sense (free) layer 304 and the keeper (magnetic flux introducing) layer 320. In addition, Fontana discloses in at least FIG. 5 that a lamination layer structure includes an antiferromagnetic layer 116, a fixed layer 118, a tunnel barrier layer 120 and a sensing ferromagnetic layer 132. Therefore, both Lin and Fontana fail to teach or suggest that a magnetic flux introducing layer is formed directly on a spacer layer.

Thus, Lin and Fontana may not be properly combined to reject Claim 14. Thus, Claim 14 is patentable over Lin in view of Fontana.

Accordingly, Applicants respectfully request withdrawal of these claim rejections.

III. Conclusion

In view of the above amendments and remarks, Applicants submit that Claims 1 – 5 and 13 – 14 are clearly allowable and the application is in condition for allowance. Notice to that effect is requested.

Respectfully submitted,

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